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Dividends From Wood Research

Recent Publications

January–June 1991

Explanation and Instructions

"Dividends From Wood Research" is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received from the printer by the FPL Publications Section between January 1, 1991, and June 30, 1991.

Each publication listed in this brochure is available through at least one of the sources below. For each entry in the brochure, we indicate the primary source for that publication and show you how to obtain a copy.

Available from FPL (indicated by an order number before the title of the publication): Quantities limited. Circle the order number on the blank at the end of the brochure and mail or FAX the blank to FPL.

Available through sales outlets (indicated by the name of the outlet and, when available, price information): Major sales outlets are the Superintendent of Documents, the National Technical Information Service (NTIS), and various private publishers. Order directly from the outlet.

Available through libraries: Research publications are available through many public and university libraries in the United States and elsewhere. U.S. Government publications are also available.

List of Categories

Publications are listed in this brochure within the following general categories:

- Biodeterioration and Protection
- Chemicals From Wood
- Energy
- Engineering Properties and Design Criteria
- Fiber and Particle Products
- Fire Safety
- General
- Microbial and Biochemical Technology
- Mycology
- Processing of Wood Products
- Pulp, Paper, and Packaging
- Timber Requirements and Economics
- Tropical Wood Utilization
- Wood Bonding Systems

Biodeterioration and Protection

1. Wood Weathering in Fluorescent Ultraviolet and Xenon Arc Chambers

Arnold, Martin; Sell, Juergen; Feist, William C.
1991. Forest Prod. J. 41(2): 40–44.

The objective of this study was to compare the effects of accelerated weathering in the water-spray-modified fluorescent ultraviolet light weathering chamber and a standard xenon arc chamber, using a water spray in conjunction with the ultraviolet light in both chambers. The weathering and erosion rates of four softwoods and one hardwood are compared.

2. Selection of Media for Screening Interaction of Wood-Attacking Fungi and Antagonistic Bacteria.

I. Interaction on Agar

Benko, Riana; Highley, Terry L.
1990. Mater. Org. 25(3): 161–171.

Various media have been used to grow fungi and antagonistic bacteria in studies of the biological control of wood-attacking fungi. The type of medium affects the interaction of the fungi and the bacteria. Media selection is very important when bacteria and fungi are grown together, because these organisms differ in their nutritional requirements, pH optima, and other growth criteria. Differences in media composition can produce diverse growth and behavioral responses. This paper reports the effect of media composition on the antagonism of bacteria to wood-attacking fungi.

3. Selection of Media for Screening Interaction of Wood-Attacking Fungi and Antagonistic Bacteria.

II. Interaction on Wood

Benko, Riana; Highley, Terry L.
1991. Mater. Org. 25(3): 173–180.

Media selection is important in examining the antagonistic effect of bacteria in the control of wood-attacking fungi. In this study, six bacteria were grown on 14 different liquid media, and wood blocks were treated with a mixture of these bacteria. The treated wood was exposed to four wood-attacking fungi to determine the best medium for control of such fungi. The bacterial preparation grown on sporulation broth gave the best protection against the fungi tested.

4. Control of Growth of Wood Decay Basidiomycetes by *Trichoderma* spp. and Other Potentially Antagonistic Fungi

Bruce, Alan; Highley, Terry L.
1991. Forest Prod. J. 41(2): 63–67.

This paper describes work undertaken to examine the interactive effects of potential biological control strains against a range of wood decay Basidiomycetes with particular attention to the production of soluble metabolites by the antagonists.

Enzyme Immunoassay to Detect *Postia placenta* in Field Tests: Comparison of Plate Elisa With Hydrophobic Cloth and Cotton Dipstick

Clausen, Carol A.

1991. Doc. No. IRG/WP/2378. The International Research Group on Wood Preservation. Working Group II Fundamentals of Testing: 8 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

Standard indirect enzyme-linked immunosorbent assay in polystyrene 96-well plates was compared to hydrophobic polyester cloth and cotton dipstick for detection of wood-derived antigens from the brown-rot fungus *Postia placenta*. The ease of handling, larger surface area, and economics of the latter two adsorbents were surveyed for application as field tests for detection of early decay.

Antifungal Activity in Metabolites From *Streptomyces rimosus*

Croan, Suki C.; Highley, Terry L.

1991. Doc. No. IRG/WP/1495. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 14 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

The objective of this study was to evaluate the efficacy of antifungal metabolites from *Streptomyces rimosus* for controlling the growth of sapwood-inhabiting fungi: sapstain fungi—*Ceratocystis coerulea*, *C. minor*, *C. pilifera*, and *Aureobasidium pullulans*; mold fungi—*Aspergillus niger*, *Penicillium* spp., and *Trichoderma* spp.

Control of Sapwood-Inhabiting Fungi by Fractionated Extracellular Metabolites From *Coniophora puteana*

Croan, Suki C.; Highley, Terry L.

1991. Doc. No. IRG/WP/1494. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 6 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

The objective of this study was to test the fractionated metabolites released by *Coniophora puteana* for their antagonistic activity against the sapstain fungi *Ceratocystis coerulea* and *Aureobasidium pullulans*, and the molds *Aspergillus niger* and *Penicillium* spp.

5. Moisture Sorption and Accelerated Weathering of Acetylated and Methacrylated Aspen

Feist, William C.; Rowell, Roger M.; Ellis, W. Dale

1991. Wood Fiber Sci. 23(1): 128–136.

The purpose of this research was to determine the effect of cell-wall chemical modification of aspen wood using acetic anhydride, lumen-fill treatment with methyl methacrylate, and the combination of these two treatments in reducing the rate and extent of moisture sorption, and in reducing the photochemical degradation caused by ultraviolet radiation and water during weathering.

6. Weathering and Finish Performance of Acetylated Aspen Fiberboard

Feist, William C.; Rowell, Roger M.; Youngquist, John A.

1991. Wood Fiber Sci. 23(2): 260–272.

This research determined the effect of cell-wall chemical modification of aspen fibers using acetic anhydride on the weathering characteristics and finish performance of fiberboard.

7. Weathering Durability of Chromium-Treated Southern Pine

Feist, William C.; Williams, R. Sam

1991. Forest Prod. J. 41(1): 8–14.

This study compares the efficacy of chromated copper arsenate and chromium trioxide treatments in decreasing the weathering of unfinished wood and improving the durability of semitransparent and solid-color stains applied to the treated wood.

Changes in Pore Structure and Cell Wall Volume in Wood Decayed by Brown- and White-Rot Fungi

Flournoy, Douglas S.

1991. Doc. No. IRG/WP/1501. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 17 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

The objectives of this study were to determine the following: (1) the pore volume in sound wood cell wall available to molecules of different size; (2) whether attack by wood decay fungi, during which wood components are removed, results in an increase in cell wall volume; and (3) whether this decay opens up the pore structure of the cell wall in a manner that allows access by large molecules.

Immuno-Scanning Electron Microscopic Localization of Extracellular Polysaccharidases Within the Fibrillar Sheath of the Brown-Rot Fungus *Postia placenta*

Green, F. III; Clausen, C.A.; Larsen, M.J.; Highley, T.L.

1991. Doc. No. IRG/WP/1497. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 12 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

This paper represents an attempt to localize extracellular polysaccharidases on the surface of hyphae and extracellular sheath of the brown-rot fungus *Postia placenta* grown on glass coverslips, using Mabs produced to the B₁-4 xylanase fraction, using immunogold-SEM. The results suggest that these enzymes are localized on fibrillar elements of the sheath structure and within the soluble sheath matrix.

8. Projected Costs for Treating Wood Pallets to Impart Chemical Resistance

Harpole, George B.; De Groot, Rodney C.; Vick, Charles B.

1991. Forest Prod. J. 41(4): 36–38.

This report presents estimated costs for treating wood pallets for resistance to chemicals. Preliminary assessments indicate that wood pallets can be produced at a cost competitive with that of nonwood pallets.

9. Laboratory Studies on Antagonism of *Scytalidium lignicola* to Wood Decay Fungi

Highley, Terry L.

1991. Mater. Org. 25(3): 181–192.

This study examines (1) dual culture of *Scytalidium lignicola* and two American Type Culture Collection *Scytalidium* isolates against several white-rot and brown-rot fungi over a malt-agar medium, (2) antagonistic ability of *S. lignicola* against decay fungi in wood, and (3) the mode of inhibitory action.

Movement and Persistence of Dazomet and Pelleted Methylisothiocyanate in Wrapped Douglas-Fir and Southern Pine Timbers

Highley, Terry L.

1991. Doc. No. IRG/WP/1496. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 5 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

The purpose of this study was to determine if fumigant efficacy in horizontal Douglas-fir and Southern Pine timbers treated with Dazomet and MIT pellets might also be enhanced by wrapping.

Laboratory Studies on Control of Sapstain and Mold on Unseasoned Wood by Bacteria

Highley, Terry L.; Benko, Riana; Croan, Suki

1991. Doc. No. IRG/WP/1493. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 7 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

A malt-agar and nonagar laboratory test was used to evaluate the efficacy of bacterial preparations as biological control agents against several sapwood-inhabiting fungi.

***Phellinus* (Hymenochaetaceae). A Survey of the World Taxa**

Larsen, M.J.; Cobb-Poulsen, L.A.

1990. Synopsis Fungorum. Vol. 3. 206 p.

Available from Fungiflora A/S, Box 95, Blindern, N-0314, Oslo 3, Norway. Cost ~ \$30.00.

This survey of the world taxa of *Phellinus* (Hymenochaetales, Hymenochaetaceae) is based on the taxonomic data in the world literature, and to a lesser extent on studies of nomenclatural types and voucher specimens by the senior author. The need for such a work seemed necessary in light of the profusion of names, synonymies, and poorly understood species concepts. The systematized data for 154 species and 67 forms and varieties are included. Keys for identification of the known taxa, restricted host index, list of excluded *Phellinus* names and cumulative name index are also provided. Several name changes are proposed: *Phellinus cancriformans* comb. et stat. nov., *P. bambusarum* comb. nov., *P. terminaliae* comb. nov., and *P. neoquercinus* nom. nov. (for *Fuscoporia quercina*).

Suppression of Aerial Hypha Formation by Spent Culture Filtrate of a Nondegradative Strain of *Postia placenta*

Micales, J.A.

1991. Doc. No. IRG/WP/1498. The International Research Group on Wood Preservation. Working Group Ia Biological Problems (Flora): 12 p.

Available from IRG Secretariat, Box 5607, S-114 86 Stockholm, Sweden. Cost: 150 Swedish crowns.

The objective of this study was to grow a normal, floccose strain of *P. placenta*, designated MAD698, in the spent culture filtrate of ME20 to determine whether the production of aerial mycelia would be affected. Commercial enzyme preparations of laminarinase, protease, and chitinase were also used to assess the effect of excessive levels of autolytic enzymes on the colony morphology of MAD698.

10. Effects of Acidic Deposition on Painted Wood

Williams, R. Sam; Baedecker, P.A.

1990. Reprinted from Acidic Deposition: State of Science and Technology. Effects of Acidic Deposition on Materials. Report 19. National Acid Precipitation Assessment Program: 19-165-19-202. Vol. 3.

The goal of research concerning the effects of acidic deposition on material surfaces is to quantify any incremental effects as a result of wet and dry deposition of hydrogen ion, sulfur dioxide, and nitrogen oxides on mass loss and other forms of alteration. This goal has been pursued by the NAPAP in the field and in laboratory test chamber experiments. This paper reviews the literature on the impact of acidic deposition on the materials selected by the NAPAP for study and reports the results of the NAPAP experimental research program on the chemical and physical processes that relate to the impact of pollutants on material surfaces. The materials selected for study under the NAPAP program included zinc-galvanized steel and other metals, carbonate stone (as monuments and building facings), and surface coatings (paints).

Chemicals From Wood

11. An Artifact in a Synthetic Pine Oil

Zinkel, Duane F.

1991. J. Ess. Oil Res. 3: 41-42.

The isopropyl ether of α -terpineol was identified as an artifact in the synthetic pine oil produced when isopropyl alcohol was used as the emulsifier.

12. Resin Acids of *Pinus ponderosa* Needles

Zinkel, Duane F.; Magee, Thomas V.

1991. Phytochem. 30(3): 845-848.

Resin acids of ponderosa pine needle oleoresins are characterized by labdane diterpenes. Imbricatolonic and/or acetyl—and succinyl—sopressic acids predominate. Succinyl derivatives of neutral diterpenes were also found.

Energy

13. Current and Projected Wood Energy Consumption in the United States

High, Colin; Skog, Kenneth

1990. In: Klass, Donald L., ed. Energy from biomass and wastes 23. Proceedings of IGT's conference; 1989 February 13-17; New Orleans, LA. Chicago, IL: Institute of Gas Technology: 229-260.

This paper is divided into sections discussing historical trends in wood energy use, present wood energy use patterns, methods used to project wood energy use to 2040, and projections of use.

Engineering Properties and Design Criteria

14. Strength and Stiffness of Spliced Nail-Laminated Posts. Part I: Review of Computer Modeling and Test Data

Bohnhoff, Dave; Moody, Russell C.

1991. Frame Bldg. Prof. 3(1): 8-10, 60, 61.

This paper provides an overview of the research that has been conducted on the strength and stiffness properties of nail-laminated posts.

15. Strength and Stiffness of Spliced Nail-Laminated Posts. Part II: Testing and Design Procedures

Bohnhoff, Dave; Moody, Russell C.
1991. *Frame Bldg. Prof.* 3(2): 4, 6, 20, 22–23.

This paper presents methods for characterizing for bending strength and stiffness properties for design. Part 1, which was published in the previous issue of this journal, provided an overview of computer modeling and laboratory test data for nail-laminated posts.

16. LRFD Concepts for Wood Systems

Gromala, David S.; Sharp, Donald J.; Moody, Russell C.
1991. In: *Structures congress '91 compact papers; 9th structures congress proceedings; 1991 April 29–May 1; Indianapolis, IN.* New York: American Society of Civil Engineers: 243–246.

This paper reviews various theoretical approaches of Load and Resistance Factor Design (LRFD) of assemblies and components and extends the analysis to the evaluation and judgment steps.

17. Feasibility Study of a Modified ASTM D 143 Block Shear Specimen for Thin Material

Kretschmann, David E.
1991. *Forest Prod. J.* 41(3): 37–39.

The feasibility of using a modified block shear specimen for shear tests of thin material was determined by comparing matched sections of modified and standard (ASTM D 143) clear Sitka spruce block shear specimens.

18. Structural Composite Lumber

McNatt, J. Dobbin; Moody, Russell C.
1990. *Progr. Archit.* December: 34–36.

This paper gives an overview of three distinct types of structural composite lumber: laminated veneer lumber (LVL), parallel strand lumber (PSL), and laminated composite lumber.

19. Performance of Stress-Laminated Bridges

Ritter, Michael A.; Geske, Earl A.; Mason, Lola; McCutcheon, William J.; Moody, Russell C.; Wacker, James
1990. *Wood Design Focus.* 1(3): 12–16.

A nationwide program was initiated in 1988 by the USDA Forest Service, Forest Products Laboratory, to monitor and evaluate timber bridge performance in order to develop, confirm, or improve methods of design fabrication and construction. This paper is a preliminary report of the performance of these stress-laminating timber bridge systems.

20. Vehicular Railing Systems for Timber Bridges: A Program Overview

Ritter, Michael A.; Post, Edward R.; Faller, Ronald K.
1990. *Wood Design Focus.* 1(4): 4–7.

This paper describes current research on the development and full-scale crash testing of bridge railing systems for timber decks.

21. Crashworthy Railing Systems for Timber Bridge Decks

Ritter, Michael A.; Post, Edward R.; Faller, Ronald K.
1991. In: *Structures congress '91 compact papers; 9th structures congress proceedings; 1991 April 29–May 1; Indianapolis, IN.* New York: American Society of Civil Engineers: 540–543.

Bridge railing has historically been designed based on static load design criteria. In recent years, full-scale crash testing has become a prevalent method of evaluating the suitability of railing systems. This paper describes a cooperative research program by the Forest Products Laboratory and the Midwest Roadside Safety Center at the University of Nebraska–Lincoln to develop and verify crashworthy railing systems for longitudinal timber bridge decks.

22. LRFD Design for Wood Bridges

Ritter, Michael A.; Williamson, Thomas G.
1991. In: *Structures congress '91 compact papers; 9th structures congress proceedings; 1991 April 29–May 1; Indianapolis, IN.* New York: American Society of Civil Engineers: 482–485.

This paper discusses a project that is underway to develop a load and resistance factor design (LRFD) edition of the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges. A part of this effort involves the development of LRFD specifications for wood structures. These new specifications will include several significant departures from current wood design practices.

23. European Yield Model for Wood Connections

Soltis, Lawrence A.
1991. In: *Structures congress '91 compact papers; 9th structures congress proceedings; 1991 April 29–May 1; Indianapolis, IN.* New York: American Society of Civil Engineers: 60–63.

This paper describes the revised National Design Specification allowable lateral strength values for nail and bolt connections. The new code is an adaptation of the European Yield Model. It also discusses how the input parameters of embedding strength and yield strength were adapted to the U.S. code.

24. Strength of Light-Gauge Steel Nailed Connections

Soltis, Lawrence A.; Hanson, Scott
1991. *Forest Prod. J.* 41(5): 57–60.

The objective of this study was to determine if the 25-percent increase in allowable lateral nail strength values for steel sideplates in the National Design Specification is valid for light-gauge steel side-plated connections, such as joist hangers.

25. The Slope-of-Grain Indicator for Defect Detection in Unplaned Hardwood Lumber

Steele, Philip H.; Neal, Stephen C.; McDonald, Kent A.; Cramer, Steven M.
1991. *Forest Prod. J.* 41(1): 15–20.

The objective of this study was to determine the potential for using the slope-of-grain indicator to detect defects in a small sample of unplaned hardwood lumber. Knots, bark pocket, simulated splits, holes, and rot were present in the specimens.

26. Structural Performance of Light-Frame Roof Assemblies. II. Conventional Truss Assemblies

Wolfe, Ronald W.; LaBissoniere, Timothy
1991. *USDA Forest Serv. Res. Pap. FPL–RP–499.* 32 p.

This report is the second (Part II) of a three-part series that covers results of a full-scale roof assembly research program. In this study, three trussed roof assemblies were tested to create a database that would aid development and verification of three-dimensional structural roof assembly models. Trusses used in these tests are representative of conventional truss fabrication practice. These roof assembly tests are an extension of a previous study reported in Part I.

27. Biaxial Beam-Column Equation for Wood Members

Zahn, John J.

1991. In: Structures congress '91 compact papers; 9th structures congress proceedings; 1991 April 29-May 1; Indianapolis, IN. New York: American Society of Civil Engineers: 56-59.

The National Forest Products Association, upon the recommendation of its Technical Advisory Committee and its Special Advisory Committee, has adopted the author's design equation for compression members under combined bending and compression for the next edition of the National Design Specification. Included in the formulation are new slenderness reduction factors. This paper compares the new and old equations and indicates their effect on design.

Influence of Correlation on Tensile Strength Prediction of Lumber

Zhao, Wei; Woeste, Frank E.

1991. Forest Prod. J. 41(2): 45-48.

Available from Frank E. Woeste, Processor, Agricultural Engineering Department, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0303. No charge.

The objective of this study was to investigate the influence of correlation on the tensile strength prediction of lumber, by comparing failure rates using a correlated weakest link theory versus an independent weakest link theory.

Fiber and Particle Products

28. Thickness Swelling and Density Variation in Aspen Flakeboards

Liu, J.Y.; McNatt, J.D.

1991. Wood Sci. Technol. 25: 73-82.

This paper reports the relationship between thickness swelling and density in laboratory-made aspen flakeboards. Results suggest that high initial moisture content and high resin content can decrease thickness swelling. Variations in mat pressure and core temperature during the press cycle and weight increase at 80 percent relative humidity are also discussed.

29. Fiberboards Made From Acetylated Bagasse Fiber

Rowell, Roger M.; Keany, Francis M.

1991. Wood Fiber Sci. 23(1): 15-22.

The purposes of this research were (1) to determine whether bagasse fiber could be acetylated by a fast, simple acetylation procedure, (2) to determine moisture sorption properties of acetylated fiber, and (3) to make fiberboards from control and acetylated fiber and determine swelling and mechanical properties on the boards.

30. Recent Advances in Lignocellulosic-Derived Composites

Rowell, R.M.; Young, R.A.

1989. In: Chum, Helena L., ed. Assessment of Biobased Materials. SER/TR-234-3610. Golden, CO: Solar Energy Research Institute. Chapter 2.

This chapter reviews the chemical modification of lignocellulosic materials, the improvements in properties of lignocellulosic materials resulting from chemical modification, the combination of lignocellulosics with other materials, and the opportunities for future composites using modified lignocellulosics in combination with other materials.

31. Forced Vibration Response of Nonlinear Top-Loaded Corrugated Fiberboard Containers

Urbanik, Thomas J.

1990. In: 61st Shock and vibration symposium; 1990 October 16-18; Pasadena, CA. Pasadena, CA: Jet Propulsion Laboratory: 253-274. Vol. 1.

A nonlinear theory of forced vibration response is developed and applied to corrugated fiberboard containers loaded in top-to-bottom cyclic compression. The theory incorporates an exact undamped free vibration solution and an approximate forced vibration solution for predicting transmissibility curves from empirical nonlinear stiffness and damping functions.

Fire Safety

32. Wall and Corner Fire Tests on Selected Wood Products

Tran, Hao C.; Janssens, Marc L.

1991. Fire Sci. 9. March-April: 106-124.

As part of a fire growth program to develop and validate a compartment fire model, several bench-scale and full-scale tests were conducted. This paper reports the full-scale wall and corner test results of step 2 of this study.

General

33. Grand Fir and Dead Western White Pine as Potential Substitutes for Western Redcedar in the Manufacture of Tapersawn Shingles

Govett, Robert L.; De Groot, Rodney; Folk, Richard L.; Gorman, Thomas M.

1991. Forest Prod. J. 41(1): 21-26.

A mill study was conducted to make a preliminary assessment of the potential technical constraints of using grand fir and dead western white pine as substitutes for western redcedar in the production of tapersawn shingles.

34. Building Excitement in the Classroom

McCarthy, Monica; Gorman, Tom

1990. The Sci. Teacher. 57(5): 43-49.

This paper explains in detail a bridge-building project for high school students. This engineering project not only illustrates basic design concepts, but the project delves deeper into basic engineering principles than other bridge-building projects using balsa wood or toothpicks. In addition, this project exposes students to more of the real world design process.

Microbial and Biochemical Technology

35. Selective Production of Extracellular Peroxidases From *Phanerochaete chrysosporium* in an Airlift Bioreactor

Bonnarme, Pascal; Jeffries, Thomas W.

1990. J. Ferment. Bioeng. 70(3): 158-163.

This paper reports on the selective production of lignin peroxidase and peroxidase in a 7-L airlift bioreactor by *P. chrysosporium*

BKM-1767 and the regulation of their production by varying Mn(II) concentrations in the culture medium.

36. Genomic Organization of Lignin Peroxidase Genes of *Phanerochaete chrysosporium*

Gaskell, Jill; Dieperink, Eric; Cullen, Daniel
1991. Nucleic Acids Res. 19(3): 599-603.

This paper reports the genomic organization of three closely linked lignin peroxidase genes. To investigate the chromosomal organization of the entire multiple lignin peroxidase gene family, *P. chrysosporium* chromosomes were resolved using pulse field electrophoresis and the multiple lignin peroxidase genes were localized to a single, dimorphic chromosome.

37. Production, Purification, and Characterization of β -(1-4)-Endoxylanase of *Streptomyces roseiscleroticus*

Grabski, Anthony C.; Jeffries, Thomas W.
1991. Appl. Environ. Microbiol. April: 987-992.

The objective of this research was to screen a number of former *Chainia* species as well as several other *Streptomyces* spp. for high xylanase titers with little or no cellulase activity. *Streptomyces roseiscleroticus* NRRL B-11019 produced the highest xylanase activity but had very little cellulase activity and was therefore selected for production, purification, and characterization of its xylanase.

38. Sensitivity to and Degradation of Pentachlorophenol by *Phanerochaete* spp.

Lamar, Richard R.; Larsen, Michael J.; Kirk, T. Kent
1990. Appl. Environ. Microbiol. 56(11): 3519-3526.

This research measured mycelial extension rates of selected strains of *Phanerochaete chrysosporium*, *Phanerochaete laevis*, *Phanerochaete sanguinea*, *Phanerochaete filamentosa*, *Phanerochaete sordida*, *Inonotus circinatus*, and *Phanerochaete chrysosporium* and the ability of these organisms to tolerate and degrade the wood preservative pentachlorophenol in an aqueous medium and in soil.

39. Biomechanical Pulping of Aspen Chips: Fungal Growth Pattern and Effects on Cell Wall, Fiber, and Pulp Morphology

Sachs, I.B.; Leatham, G.F.; Myers, G.C.; Wegner, T.H.
1990. In: Kirk, T. Kent; Chang, Hou-Min, eds. Biotechnology in pulp and paper manufacture—Applications and fundamental investigations. Stoneham, MA: Butterworth-Heinemann. Chapter 3.

This study used the scanning electron microscope to obtain information on the ultrastructural changes in the wood structure caused by *P. chrysosporium* under conditions that model the bioreactor process. It demonstrated the pattern of fungal growth on the surface and inside nutrient-supplemented aspen chips, lumina, and throughout the wood cell wall layers. It also demonstrated the characteristics of pulp prepared from fungal-treated chips as well as the effect of BMP and pulps made by other processes in paper production as seen in cross sections of 60-g/m² TAPPI handsheets.

40. Purification and Properties of Xylitol Dehydrogenase From the Xylose-Fermenting Yeast *Candida shehatae*

Yang, Vina W.; Jeffries, Thomas W.
1990. In: Appl. Biochem. Biotechnol. 26(2): 197-206.

The objective of this study was to investigate whether the characteristics of xylitol dehydrogenase from *Candida shehatae* are different from those of *Pachysolen tannophilus*.

Mycology

41. Cross-Blot: A Rapid Screening Procedure for Determining Specificity of Antibodies to Native Proteins of the Brown-Rot Fungus *Postia placenta*

Clausen, Carol A.; Green III, Frederick; Highley, Terry L.
1991. FEMS Microbiol. Letters. 78: 315-318.

A method is described for rapidly screening large numbers of mono- or poly-clonal antibodies for specificity with an equivalent number of antigens on a single sheet of nitrocellulose paper. This method, referred to as cross-blot, uses only 120 ml of antigen or antibody and can be completed in less than 6 h.

Processing of Wood Products

42. Recent Developments in Veneer Peeling Confront Quality Variables

Spelter, Henry
1991. Panel World. 31(3): 54-55, 63-65.

This paper examines veneer peeling technology, focusing on block condition, knife angle, pitch and bevel, nosebar pressure, trouble-shooting, and quality control. These variables that affect veneer quality and the technology developed to improve veneer quality are reviewed.

Pulp, Paper, and Packaging

43. The Structures of Cellulose

Atalla, Rajai H.
1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium; 1990 April 18-20; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 89-98. Vol. 197.

This paper presents an overview of studies on the structures of cellulose. After presenting a brief historical perspective, the paper reviews diffractometrically based structural models and then describes recent developments based on models that are consistent with both diffractometric and spectroscopic observations.

44. Tensile Creep of Paperboard—Effect of Humidity Change Rates

Gunderson, Dennis E.; Tobey, Wayland E.
1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium; 1990 April 18-20; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 213-226. Vol. 197.

The work reported is intended to contribute specific observations regarding the tensile creep response of paperboard to cyclic relative humidity in the hope that these observations will eventually be useful in both formulating and evaluating proposed mechanisms of behavior and criteria for ranking paper performance.

45. Contaminant Removal From Recycled Wastepaper Pulps

Klungness, John H.; Lin, Cheng-Hsiung; Rowlands, Robert E.
1990. In: Proceedings, 1990 TAPPI pulping conference; 1990 October 14-17; Toronto, ON, Canada. Atlanta, GA: TAPPI Press; 8-12. Book 1.

Technical barriers to cleaning wastepaper pulps reduce the cost effectiveness of deinking and synthetic contaminant removal. One such barrier is the loss in separation efficiency that occurs when disk separation processing rates are scaled up. This paper reports separation data on varying the level of feed solids, and it contains high-speed photographs of the separation phenomenon.

46. Effects of Azidosilane Treatments of Wood and Cellulose Fiber Surfaces on Adhesion to Polypropylene

Kolosick, Paul C.; Scott, C.T.; Koutsky, J.A.; Myers, G.E. 1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. *Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium*; 1990 April 18–20; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 119–124. Vol. 197.

This paper discusses the results of studies of azidosilane coupling agent with wood veneer-polypropylene laminates and with cellulosic fiber-polypropylene papers. For the veneer samples, the force required to peel the polypropylene film from the veneer was measured. In the paper samples, the tensile strength, tensile modulus, elongation, and tensile energy absorption were measured.

47. Delignification of Wood Fibers With Peroxymonosulfate

Minor, James L.; Springer, Edward L. 1990. *Paperi ja Puu—Paper and Timber*. 72: 10.

In this study, cold-soda pulps, hardboard fibers, and destructured wood were delignified to various extents with acidic peroxymonosulfate solutions. Variables of the pulping reaction were studied as well as the bleachability and properties of the pulps obtained.

48. Extruded Wood-Flour Polypropylene Composites: Effect of a Maleated Polypropylene Coupling Agent on Filler-Matrix Bonding and Properties

Myers, George E.; Kolosick, Paul C.; Chahyadi, Ichwan S.; Coberly, Camden A.; Koutsky, James A.; Ermer, Donald S. 1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. *Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium*; 1990 April 18–26; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 67–76. Vol. 197.

Full factorial studies were conducted to determine the effects of a coupling agent (a low molecular weight maleated polypropylene (MAPP)) and other composition and processing variables on the mechanical properties of a wood-flour-filled polypropylene (PP) composite. Effects of MAPP on the bonding between PP and wood veneer were also examined.

49. Lignins: Structure and Distribution in Wood and Pulp

Obst, John R. 1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. *Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium*; 1990 April 18–20; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 11–20. Vol. 197.

This paper, intended mainly for those unfamiliar with the details of lignin chemistry, provides an overview of the formation, structure, and distribution of lignins in wood and of the distribution of lignin in pulp fibers.

50. Materials Science of Lignocellulosics

Rowell, Roger M. 1990. In: Caulfield, D.F.; Passaretti, J.D.; Sobczynski, S.F., eds. *Materials interactions relevant to the pulp, paper, and wood industries: Proceedings, Materials Research Society symposium*; 1990 April 18–20; San Francisco, CA. Pittsburgh, PA: Materials Research Society; 3–9. Vol. 197.

This paper provides a summary of the materials science of lignocellulosics. It discusses the lignocellulosics as composites and materials, the properties of lignocellulosics, and the future of lignocellulosic materials.

51. Biological Treatments as an Alternative to Chemical Pretreatments in High-Yield Wood Pulping

Wegner, Theodore H.; Myers, Gary C.; Kirk, T. Kent 1991. *Tappi J.* 73(3): 189–193.

This study presents the results of using two white-rot fungi, *Phanerochaete chrysosporium* and *Phlebia tremellosa*, in pretreating nutrient-supplemented aspen wood chips. Strength and optical properties of handsheets made from the pretreated wood pulp are compared to those properties of handsheets made from groundwood, refiner mechanical thermomechanical, chemithermo-mechanical, semichemical, and kraft pulps.

Timber Requirements and Economics

Wood Used in New Residential Construction in the United States

Anderson, Robert G.; McKeever, David B. 1988. Published by Wood Products Promotion Council: American Plywood Association, American Wood Council, National Forest Products Association, Southern Forest Products Association, Western Wood Products Association, and USDA Forest Service, Forest Products Laboratory.

Available from American Plywood Association, P.O. Box 11700, Tacoma, WA 98411. Cost: \$100.00.

This study provides a comprehensive overview of lumber and structural panel use in new residential construction by building application. Less detailed information is also provided for nonstructural panels and nonwood competitive materials.

52. Are Our Traditional Attitudes Restricting Forestry Management Options?

Lentz, Robert J.; Sims, Daniel H.; Ince, Peter J. 1989. In: Waldrop, Thomas A., ed. *Proceedings of pine-hardwood mixtures: a symposium on management and ecology of the type*; 1989 April 18–19; Atlanta, GA. Gen. Tech. Rep. SE–58. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 20–24.

This paper discusses how environmental influences and market-processing trends are changing the future of forestry in the South. It suggests that forest management options must be broadened beyond the current mindset to achieve future environmental and economic goals, and that a pine hardwood mixture on appropriate sites is a positive response to future trends.

53. Manipulating Process Variables to Achieve Structural Board Properties

Spelter, Henry

1990. C.C. Crow Publications Inc. 5(5): 28-34.

This article explains (1) how a producer of oriented strandboard (OSB) can build strength qualities into a panel to make it fit a given need, (2) how OSB compares with plywood in strength tests, and (3) what factors are varied to enable producers of OSB to change the qualities of their board.

54. VENVAL: A Plywood Mill Cost Accounting Program

Spelter, Henry

1991. USDA Gen. Tech. Rep. FPL-GTR-68. 25 p.

This report documents a package of computer programs called VENVAL. These programs prepare plywood mill data for a linear programming (LP) model that, in turn, calculates the optimum mix of products to make, given a set of technologies and market prices. (The software to solve a linear program is not provided and must be obtained separately.) Linear programming finds the best solutions for a given set of circumstances. This report illustrates and describes the software programs of VENVAL and its use in LP for softwood plywood mill operations.

Tropical Wood Utilization

55. International Tropical Timber Organization Meets

Lindell, Gary

1991. Import/Export Wood Purchasing News. 17(4): 10.

This 1-page news article summarizes the International Tropical Timber Organization's annual meeting held in Japan in 1990.

56. Forest Products From Latin America—An Almanac of the State of the Knowledge and the State of the Art

Maeglin, Robert R., ed.

1991. USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-67. 151 p.

This document is based on an extensive survey of the world literature pertaining to Latin American woods and their use. It contains a discussion of the resource, the literature, the state of the knowledge, and the state of the art in actual practice, by primary and secondary processing and by product areas within the processing options. Discussions about new initiatives and programs that are needed in research, technology transfer, and training are included. In addition, lists of references, the bibliography, and limited lists of the tree species are discussed in the literature.

Wood Bonding Systems

57. How Overdrying Wood Reduces Its Bonding to Phenol-Formaldehyde Adhesives: A Critical Review of the Literature. Part II. Chemical Reactions

Christiansen, Alfred W.

1991. Wood Fiber Sci. 23(1): 69-84.

This is the second part of a critical literature review that deals with the ways in which excessive drying (overdrying) causes wood surfaces to be "inactivated" in bonding. Part I covered general aspects of wood surface inactivation and reviewed physical mechanisms by which overdrying weakens bonding.

58. Delamination of Edge-Glued Wood Panels: Moisture Effects

River, Bryan H.; Okkonen, E. Arnold

1991. USDA Forest Serv. Res. Note FPL-RN-0259. 11 p.

Delamination of edge-glued furniture and cabinet panels or narrow face-laminated turning squares is a fairly common problem, particularly during the heating season. The problem is not restricted to any particular glue or species. Why these failures occur and how they can be prevented is the subject of this report. The relationships of species, glue consistency, and clamping pressure, with emphasis on the role of moisture content in delamination, are discussed.

Special Item

Exterior Wood in the South: Selection, Applications, and Finishes

Cassens, Daniel L.; Feist, William C.

1991. USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-69. 60 p.

Single copies available from the Forest Products Laboratory, One Gifford Pinchot Drive, Madison, WI 53705-2398.

This report describes the characteristics of wood finishes and their proper application to solid and reconstituted wood products. It describes how manufacturing and construction practices affect the surfaces of wood products, how various types of finishes interact with the surface, and how weathering affects the finished surfaces. Methods for selecting and applying various exterior wood finishes are presented. Finally, the failure and discoloration of wood finishes are discussed, and methods are described for preventing these problems. The information in this report provides a guide for obtaining maximum service life for finished exterior wood products in the South.

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